Energy Policy

PPOL 3210

Instructor Info

Prof. Magdalena Klemun

Office Hrs: On demand (please email me)

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Course Info

Prereq: None

Tues & Thurs

12-1.20pm

Online until further notice

TA Info

Viktoria Doeme

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TBD

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Overview

This course addresses two fundamental questions about energy policy: Why and how do governments intervene in energy markets? What do we know about the relationships between government decisions and the economic and environmental performance of energy systems? The class begins with an overview of four major energy-related challenges confronted by policymakers: 1) Climate change and environmental degradation, 2) energy poverty and inequity issues, 3) the global competition for natural resources, and 4) barriers to sustainable energy use and the need for technology innovation. Students are introduced to a variety of policy types through the lens of energy technologies and their historical and ongoing development. We examine the role of data, models, and uncertainties in energy policy decisions and discuss linkages between energy, climate and technology policy. The primary focus of the course will be international, with some more in-depth discussion of policies in Asia, North America, and Europe.

Learning Objectives

By the end of this course, students will be able to:

- Explain the motivations for energy policy making and its key objectives
- Distinguish socio-economic, technological, and scientific dimensions of current energy debates
- Understand strengths and weaknesses of key policy assessment approaches
- Develop and effectively communicate policy-related arguments
- Understand major challenges and uncertainties in energy policy making

Grading Scheme

10%	Class participation
15%	Quizzes
25%	Assignments
20%	Midterm Exam
30%	Final Project

Final project

The project is an opportunity for students to deepen their energy policy knowledge through research conducted in groups. All projects will involve literature review, data collection, data analysis, and data visualization, but the emphasis can be placed in different ways depending on students' interest and background. There will be a list of suggested topics provided by the instructor; student groups are welcome to propose alternative topics. Project presentations will be held on May 5 and May 10, and final papers/datasets are due on May 17th. A detailed project description will be posted on Canvas and the timeline and grading criteria will be discussed in class.

COVID-19

Self-monitoring, isolation, treatment. The University encourages all students to get vaccinated. If anyone cannot be vaccinated for medical / personal reasons, regular COVID-19 testing with results submitted to the University for confirmation will be required. Please refer to https://covid19info.ust.hk for details and stay up to date on government measures to reduce the spread of the virus (https://www.coronavirus.gov.hk/eng/index.html). Students are encouraged to share any COVID-related concerns with the instructor.

Make-up and Late Homework Policy

Make-up exams or assignments will only be allowed for students who have a substantiated excuse approved by the instructor before the due date. Quiz dates and assignment due dates have been included in the Class Schedule to help students plan ahead. Sometimes things do not go as planned, however, and students are therefore allowed to use three late days over the course of the semester, either all at once (turn in an assignment three days after the due date) or spread over different assignments. Assignments are generally due by 11:59pm on the date listed on the schedule. Student literature presentations (March 17 and 22, details to be discussed in class) count towards Assignment grades.

Diversity and Inclusivity Statement

All members of this class are expected to contribute to a respectful, welcoming and inclusive environment. Diversity, equity, justice, and inclusion are important values at HKUST and in this class. Students are encouraged to continually learn from each others' diverse backgrounds and viewpoints.

Accommodations for Students with Disabilities

I am committed to ensure that students with disabilities can fully participate in this course. Please email me as soon as possible to set up a time to discuss your needs.

Academic Integrity

Academic integrity and honesty are critical values, at HKUST in general and in this class. Students are expected to be familiar with HKUST's Academic Honor Code. More information can be found here: http://ugadmin.ust.hk/integrity/student-1.html. Violations of the Code are serious and will be handled in a manner that represents the extent of the Code and that befits the seriousness of its violation.

Class Schedule

MODULE 1: Introduction to Energy Policy and Key Challenges

Feb 8	Introduction to Energy Policy	Chapters 1-4 and Chapter 9 in: Grubler A, Nakicenovic N, Pachauri S, Rogner H-H, Smith KR, et al., 2014: Energy Primer. International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1-118. Gillingham, K. and Sweeney, J., 2012. Barriers to implementing low-carbon technologies. *Climate Change Economics*, 3(04), p.1250019.
Feb 10	Cimate change I: Basics, scale, uncertainty	Chapter 7 in: Grubler A, Nakicenovic N, Pachauri S, Rogner H-H, Smith KR, et al., 2014: Energy Primer. International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1-118. Pages 51-72 in Allen, M.R., O.P. Dube, W. Solecki, F. Aragón-Durand, W. Cramer, S. Humphreys, M. Kainuma, J. Kala, N. Mahowald, Y. Mulugetta, R. Perez, M. Wairiu, and K. Zickfeld, 2018: Framing and Context. In: Global Warming of 1.5 °C. An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels
Feb 15	Climate change II: Insights from models	McCollum, D.L., Zhou, W., Bertram, C., De Boer, H.S., Bosetti, V., Busch, S., Després, J., Drouet, L., Emmerling, J., Fay, M. and Fricko, O., 2018. Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy*, 3(7), pp.589-599.
Feb 17	Environmental degradation	Steffen, W., Richardson, K., Rockstrom, J., Cornell, S.E., Fetzer, I., Bennett, E.M., Biggs, R., Carpenter, S.R., De Vries, W., De Wit, C.A. and Folke, C., 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223). Luderer, G., Pehl, M., Arvesen, A., Gibon, T., Bodirsky, B.L., de Boer, H.S., Fricko, O., Hejazi, M., Humpenöder, F., Iyer, G. and Mima, S., 2019. Environmental co-benefits and adverse side-effects of alternative power sector decarbonization strategies. *Nature communications*, 10(1), pp.1-13.
Feb 22	Energy poverty and equity issues	Energy Primer, Chapter 8 (pp. 65-76) Grubler A, Nakicenovic N, Pachauri S, Rogner H-H, Smith KR, et al., 2014: Energy Primer. International Institute for Applied Systems Analysis, Laxenburg, Austria, pp. 1-118. Rao, N.D. and Pachauri, S., 2017. Energy access and living standards: some observations on recent trends. *Environmental Research Letters*, 12(2), p.025011.
Feb 24	The global competition for natural resources (Assignment 1 due)	Krautkraemer, J.A., 2005. Economics of natural resource scarcity: The state of the debate (No. 1318-2016-103362). Gholz, E., 2014. Rare Earth Elements and National Security. Council on Foreign Relations

Mar 1	Barriers and technology innovation needs I	Gallagher, K.S., Grubler, A., Kuhl, L., Nemet, G. and Wilson, C., 2012. The energy technology innovation system. *Annual review of environment and resources*, 37, pp. 137-162.
Mar 3	Barriers and technology innovation needs II (Quiz 1)	Pages 317-354 in: Energy Technology Perspectives 2020, International Energy Agency Pages 315-327 in Strengthening and Implementing the Global Response. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels

MODULE 2: Methods, Concepts, Models (Part One)

March 8	Concepts in Policy Analysis	MacRae, D., 1979. Concepts and methods of policy analysis. Society, 16(6), pp. 17-23
March 10	Policy brief: The why's and how to's	Policy brief: University of North Carolina Chapel Hill (check Canvas)
March 15	Energy data: Sources, uncertainties, visualization	Koomey, J.G., Calwell, C., Laitner, S., Thornton, J., Brown, R.E., Eto, J.H., Webber, C. and Cullicott, C., 2002. Sorry, wrong number: The use and misuse of numerical facts in analysis and media reporting of energy issues. *Annual review of energy and the environment*, 27(1), pp.119-158.
	Minutes 1-35 of a lecture by Edward Tufte	https://www.youtube.com/watch?v=rHUDJ8RyseQ
March 17	Student literature presentations I (This is assignment 2)	A list of paper options will be posted on Canvas
March 22	Student literature presentations II (This is assignment 2)	A list of paper options will be posted on Canvas

MODULE 3: Technologies and Policy Cases

March 24	Fossil fuels I: Coal	Tong, D., Zhang, Q., Zheng, Y., Caldeira, K., Shearer, C., Hong, C., Qin, Y. and Davis, S.J., 2019. Committed emissions from existing energy infrastructure jeopardize 1.5 °C climate target. *Nature*, 572(7769), pp.373-377. Chapter 8 (on coal) in Sandalow, D., 2019. Guide to Chinese Climate Policy 2018. Columbia/SIPA Center on Global Energy Policy. Qi, Y., Stern, N., Wu, T., Lu, J. and Green, F., 2016. China's post-coal growth. *Nature Geoscience*, 9(8), p.564.
March 29	Fossil fuels II: Natural gas and oil	Chapter 11 (on natural gas) in Sandalow, D., 2019. Guide to Chinese Climate Policy 2018. Columbia/SIPA Center on Global Energy Policy.

		Klemun, M.M. and Trancik, J.E., 2019. Timelines for mitigating the methane impacts of using natural gas for carbon dioxide abatement. *Environmental Research Letters*, 14(12), p.124069.
March 31	Nuclear energy	Chapter 10 (on nuclear) in Sandalow, D., 2019. Guide to Chinese Climate Policy 2018. Columbia/SIPA Center on Global Energy Policy. Eash-Gates, P., Klemun, M.M., Kavlak, G., McNerney, J., Buongiorno, J. and Trancik, J.E., 2020. Sources of Cost Overrun in Nuclear Power Plant Construction Call for a New Approach to Engineering Design. *Joule*, 4(11), pp.2348-2373.
April 7	MIDTERM	
April 12	Hydropower	Moran, E.F., Lopez, M.C., Moore, N., Müller, N. and Hyndman, D.W., 2018. Sustainable hydropower in the 21st century. *Proceedings of the National Academy of Sciences*, 115(47), pp.11891-11898.
April 19	Solar and wind	Kavlak, G., McNerney, J. and Trancik, J.E., 2018. Evaluating the causes of cost reduction in photovoltaic modules. Energy policy, 123, pp.700-710. Chapter 9 in Sandalow, D., 2019. Guide to Chinese Climate Policy 2018. Columbia/SIPA Center on Global Energy Policy. Bell, D., Gray, T. and Haggett, C., 2005. The 'social gap' in wind farm siting decisions: explanations and policy responses. Environmental politics, 14(4), pp.460-477.
April 19/21	Distributed energy, restructuring, storage	Joskow, P.L., Bohi, D.R. and Gollop, F.M., 1989. Regulatory failure, regulatory reform, and structural change in the electrical power industry. Brookings papers on economic activity. Microeconomics, 1989, pp.125-208. Kittner, N., Lill, F. and Kammen, D.M., 2017. Energy storage deployment and innovation for the clean energy transition. *Nature Energy*, 2(9), p.17125.
April 21/26	Transportation, energy efficiency, behavior (Quiz 2 on April 26)	Executive Summary in: MIT Energy Initiative, 2019. Insights into Future Mobility. Knittel, C.R., 2012. Reducing petroleum consumption from transportation. *Journal of Economic Perspectives*, 26(1), pp.93-118. Wilson, C., Grubler, A., Gallagher, K.S. and Nemet, G.F., 2012. Marginalization of end-use technologies in energy innovation for climate protection. *Nature Climate Change*, 2(11), pp.780-788. Stern, P.C., 1986. Blind spots in policy analysis: What economics doesn't say about energy use. *Journal of Policy Analysis and management*, 5(2), pp.200-227.

MODULE 4: Methods, Concepts, Models (Part Two)

April 28	Introduction to energy models	Herbst, A., Toro, F., Reitze, F. and Jochem, E., 2012. Introduction to energy systems modelling. *Swiss journal of economics and statistics*, 148(2), pp.111-135.
May 3	Integrated assessment models	Weyant, J., 2017. Some contributions of integrated assessment models of global climate change. *Review of Environmental Economics and Policy*, 11(1), pp.115-137. Jewell, J. and Cherp, A., 2020. On the political feasibility of climate change mitigation pathways: Is it too late to keep warming below 1.5°C?. Wiley Interdisciplinary Reviews: Climate Change, 11(1), p.e621.

FINAL PRESENTATIONS AND CLASS WRAP-UP

May 5	Final presentations I
May 10	Final presentations II